

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A corneal surgery apparatus comprising:

an irradiation optical system having an irradiation reference axis, for irradiating onto a cornea a laser beam which brings about ablation of a the cornea of a patient's eye onto the cornea; a moving unit alignment means which relatively moves for moving the irradiation reference axis optical system in two-dimensional X and Y directions orthogonal thereto with respect to the a patient's eye to perform alignment in the X and Y directions and moving the irradiation optical system in a Z direction with respect to the patient's eye to perform alignment in the Z direction;

a positional displacement detection unit means which detects a predetermined position of the patient's eye for detecting one of a pupil and a corneal limbus by picking up an image of an anterior-segment of the patient's eye and performing image processing thereon an image signal thereof, and detects a direction and amount of positional displacement of the detected position in the two-dimensional directions with respect to the irradiation reference axis;

a memory which stores a center and shape of the one of the pupil and the corneal limbus detected when the alignment in the X, Y and Z directions is performed;

an inclination detection unit which detects at least one of a characteristic point in the anterior segment and a target provided to the anterior segment by picking up an image of the anterior segment and processing an image signal thereof, and based on a detection result thereof, detects a direction and angle of inclination of the patient's eye with respect to the irradiation reference axis calculation means for obtaining X, Y positional deviation information on the eye based on change of a center of the one of the pupil and the corneal limbus detected during surgery from the center of the one of the pupil and the corneal limbus stored in the memory, then obtaining duction information on an eyeball based on change of a shape of the one of the pupil and the corneal limbus detected during the surgery from the shape of the one of the pupil and the corneal limbus stored in the memory and change in a slit image projected onto an iris from a symmetric direction so as to intersect with the irradiation optical axis, and then obtaining alignment deviation in the X and Y directions based on the obtained X, Y positional deviation information and the obtained duction information; and

a movement control unit means which for operating the alignment means to perform the

alignment in the X and Y directions obtains control data for the moving unit based on the detected direction and amount of positional displacement and the detected direction and angle of inclination obtained alignment deviation in the X and Y directions.

2-7. (Cancelled)

8. (Currently amended) A corneal surgery apparatus comprising:

an irradiation optical system having an irradiation reference axis, for irradiating onto a cornea a laser beam which brings about ablation of the cornea of a patient's eye onto the cornea;
moving alignment means for relatively moving the irradiation reference axis optical system in two-dimensional X and Y directions orthogonal thereto with respect to the patient's eye to perform alignment in the X and Y directions and moving the irradiation optical system in a Z direction with respect to the patient's eye to perform alignment in the Z direction;

positional displacement detection means for detecting a predetermined position of the patient's eye one of a pupil and a corneal limbus by picking up an image of an anterior-segment of the patient's eye and performing image processing thereon an image signal thereof, and detecting a direction and amount of positional displacement of the detected position in the two-dimensional directions with respect to the irradiation reference axis;

a memory which stores a center and shape of the one of the pupil and the corneal limbus detected when the alignment in the X, Y and Z directions is performed;

inclination detection calculation means for detecting at least one of a characteristic point in the anterior segment and a target provided to the anterior segment by picking up an image of the anterior segment and processing an image signal thereof, and based on a detection result thereof, detecting a direction and angle of inclination of the patient's eye with respect to the irradiation reference axis obtaining X, Y positional deviation information on the eye based on change of a center of the one of the pupil and the corneal limbus detected during surgery from the center of the pupil or the corneal limbus stored in the memory, then obtaining duction information on an eyeball based on change of a shape of the one of the pupil and the corneal limbus detected during the surgery from the shape of the one of the pupil and the corneal limbus stored in the memory and

change of at least three marks provided to a sclera and extending in meridional directions, and then obtaining alignment deviation in the X and Y directions based on the obtained X,Y positional deviation information and the obtained duction information; and

movement control means for obtaining control data for the moving means operating the alignment means to perform the alignment in the X and Y directions based on the detected direction and amount of positional displacement and the detected direction and angle of inclination obtained alignment deviation in the X and Y directions.

9-18. (Cancelled)